

WHAT IS CLAIMED:

1. A method for operating an alternator of a motor vehicle, comprising:

- 5 monitoring an amount of stored electrical energy available to operate the vehicle;
estimating a vehicle electrical load; and
regulating an output of the alternator based at least in part on the amount of electrical energy
10 available to the vehicle and the estimated electrical load of the vehicle.

2. The method according to claim 1, further comprising the steps of:

- 15 monitoring operation of vehicle electrical components; and
estimating the vehicle electrical load based on the operation of the vehicle components.

3. The method according to claim 1, further comprising the steps of:

- 20 deriving a schedule of operation of vehicle electrical components; and
estimating the vehicle electrical load based on the
25 scheduled operation of the vehicle components.

4. The method according to claim 1, wherein said monitoring step comprises the step of monitoring a battery state of charge.

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5. The method according to claim 4, wherein said regulating step comprises selecting an alternator setpoint voltage based on at least in part on the battery state of charge and the estimated vehicle electrical
35 load.

6. The method according to claim 5, wherein said step of selecting an alternator voltage comprises:

deriving a plurality of voltage regulation classifications; and

selecting one of a plurality of voltage regulation strategies corresponding to the voltage regulation classifications.

7. The method according to claim 6, further comprising the step of providing a battery temperature, and further wherein each of the voltage regulation strategies are a function of battery temperature.

8. The method according to claim 6, further comprising the steps of:

monitoring operation of critical vehicle loads; and selecting one of said voltage regulation strategies based at least in part on the operation of the critical vehicle loads.

9. The method according to claim 6, further comprising the step of selecting a setpoint transition strategy to transition operation between the voltage regulation strategies.

10. A method for operating an alternator of a motor vehicle having a battery coupled to the alternator for storing electrical energy, comprising:

monitoring a battery state of charge; monitoring operation of vehicle electrical components; estimating a vehicle electrical load based on the operation of the vehicle components; and regulating an output of the alternator based at least in part on the battery state of charge and the estimated vehicle electrical load.

11. The method according to claim 10, wherein said regulating step comprises selecting an alternator setpoint voltage based at least in part on the battery

state of charge and the estimated vehicle electrical load.

12. The method according to claim 11, wherein said
5 step of selecting an alternator voltage comprises:
deriving a plurality of voltage regulation
classifications; and
selecting one of a plurality of voltage regulation
strategies corresponding to the voltage regulation
10 classifications.

13. The method according to claim 12, further
comprising the step of providing a battery temperature,
and further wherein each of the voltage regulation
15 strategies are a function of battery temperature.

14. The method according to claim 12, further
comprising the steps of:
monitoring operation of critical vehicle loads; and
20 selecting one of said voltage regulation strategies
based at least in part on the operation of the critical
vehicle loads.

15. The method according to claim 12, further
25 comprising the step of selecting a setpoint transition
strategy to transition operation between the voltage
regulation strategies.

16. A system for operating an alternator of a motor
30 vehicle, comprising:
a first monitor for indicating an amount of stored
electrical energy available to operate the vehicle;
a second monitor for indicating operation of vehicle
electrical components; and
35 a controller coupled to the first and second
monitors for estimating a vehicle electrical load based
on operation of vehicle electrical components and for
regulating an output of the of the alternator based at
least in part on the indicated amount of stored

electrical energy and the estimated vehicle electrical load.

17. The system according to claim 16, wherein said
5 first monitor comprises a battery state of charge monitor.

18. The system according to claim 16, wherein said
10 second monitor comprises means coupled to the vehicle electrical components for communicating information indicative of vehicle electrical load.

19. The system according to claim 16, wherein said
controller comprises:
15 means for monitoring operation of the vehicle electrical components; and
means for estimating the vehicle electrical load based on the operation of the vehicle components.

20. The system according to claim 16, wherein said
controller comprises:
means for deriving a schedule of operation of the
vehicle electrical components; and
means for estimating the vehicle electrical load
25 based on the scheduled operation of the vehicle components.

21. The system according to claim 16, wherein said
controller comprises means for selecting an alternator
30 setpoint voltage based on the battery state of charge and the estimated vehicle electrical load.

22. The system according to claim 21, wherein said
controller comprises:
35 means for deriving a plurality of voltage regulation classifications; and
means for selecting one of a plurality of voltage regulation strategies corresponding to the voltage regulation classifications.

23. The system according to claim 22, further comprising a sensor for providing a battery temperature and further wherein each of the voltage regulation
5 strategies are a function of battery temperature.

24. An article of manufacture for operating an alternator of a motor vehicle having a battery coupled to the alternator for storing electrical energy, said
10 article of manufacturing comprising:

a computer usable medium; and

a computer readable program code embodied in the computer usable medium for directing a computer to control the steps of monitoring a battery state of
15 charge, monitoring operation of vehicle electrical components, estimating a vehicle electrical load based on the operation of the vehicle components and regulating an output of the alternator based at least in part on the battery state of charge and the estimated vehicle
20 electrical load.